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DELAWARE-OTSEGO AUDUBON SOCIETY, INC.

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P.O. Box 544, ONEONTA, NY 13820

## **DOAS RAPTOR SURVEYS IN THE PROPOSED BLUESTONE WIND PROJECT DURING LATE WINTER AND SPRING 2019**

### **SUMMARY**

The Delaware-Otsego Audubon Society conducted field surveys of raptors from early February through late March, 2019 in the area of the proposed Bluestone Wind Project, Broome County, NY. The surveys focused on Bald and Golden Eagles which had been documented in significant numbers in the same area in late winter-early spring surveys in 2018.

130.5 hours of observation were conducted over 20 days. There were 172 Bald Eagle observations and 28 Golden Eagle observations during the survey. Birds were observed in a number of activities including kiting, cooperative hunting, perching, food clashes, potential territorial clashes, and using lift from a ridge for gliding. Much of this activity was within or in close proximity to proposed wind turbine locations.

**April, 2019**

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## **BACKGROUND**

On October 16, 2017 the Delaware-Otsego Audubon Society (DOAS) was awarded intervenor funding through the NY State Department of Public Service Article 10 review process for the proposed Bluestone Wind Project in Broome County, NY. Funding was granted for the analysis of GPS tracking data from Golden Eagles, and for on-the-ground surveys of raptors to be conducted during fall 2017 and spring 2018 at the peak of the Golden Eagle migration.

Due to the high numbers of Bald Eagles and Golden Eagles observed in 2018, and suggestions in the project's Avian Risk Assessment that the non-migrant Golden Eagles were migrants, DOAS elected to conduct additional surveys at its own expense. DOAS chose to start observations in early February to resolve questions raised about the seasonal status of adult Golden Eagles in the project area. Early February is outside the migratory period even for adult birds. Seasonal status has a direct bearing on the level of risk. Migrants may spend minutes in the project area. Non-migrants may spend days, weeks or longer. Conducting surveys in March 2019 provides a means of comparison to March 2018 levels of eagle use.

Additional intervenor funding through the Article 10 process was awarded on February 20, 2019 to have eastern Golden Eagle expert Dr. Tricia A. Miller examine data and documents relating to eagles in the project area. Her subsequent report, Assessment of Seasonal Status of Golden Eagles Observed in the Bluestone Wind Project Area, is a detailed analysis that reviews all Golden Eagle observations by DOAS observers during both field seasons.

Reports on the fall 2017 and spring 2018 surveys are available on the NYSDPS web site. This report covers additional surveys by DOAS observers during February and March 2019 at the same site as the March 2018 surveys, in the Town of Sanford, Broome Co., NY. Site coordinates are 42.103105° - 75.479114°, UTM - 18T 460385 E 4661335 N. The site is the same as WEST's survey point 15.

## **2019 SURVEYS**

Surveys commenced on 5 February and continued through 20 March. No eagles were observed on 5 February, the only day without eagles. The first winter resident Golden Eagles were 2 adults observed cooperatively hunting on 9 February. Additional documentation and discussion of non-migratory Golden Eagles observed during these surveys is found elsewhere in this report. With a significant data set from 2018 on the more common raptors, this report limits discussion to NY State Threatened or Endangered Species: Bald Eagle, Golden Eagle, Northern Harrier and Peregrine Falcon (Listed species). Field notes and migration data for unlisted raptors and other birds can be found in the DOAS spring 2019 data spreadsheet and on hawkcount.org.

DOAS was not asked to record "eagle minutes" by any agency in 2018. Eagle minutes are the amount of time eagles spend flying in an 800 meter radius circle that extends 200 meters above ground level (AGL). These data are used to calculate risk using a Bayesian Risk Model. We chose to record eagle minutes in 2019. A consultation with US Fish and Wildlife Service (USFWS) resulted in changes to the protocol (Appendix C) from previous surveys. Observers were provided with a map showing distances to nearby landmarks in order to judge the 800 meter distance. The elevation difference between the survey site (365m) and the 2 highest hilltops to the east (579m) is 214 meters. DOAS observers were

instructed to use the height of this ridge – with 2 hilltops slightly above the 200m height threshold – as a gauge for estimating raptor heights AGL.

NYSDEC requested detailed data recording – including the mapping of flight paths - for Bald and Golden Eagles and two additional at risk species - Northern Harrier and Peregrine Falcon. Data was recorded on a revised “Listed Species” form. These data were entered daily into a spreadsheet. From 22 February 2019 on, data was also entered into the hawkcount.org database. No Northern Harriers were observed in 2019.

Three qualified hawk counters from the Franklin Mountain Hawk Watch were recruited to conduct surveys at the site. Surveyors were questioned to ensure they understood the protocol and the system for recording data.

At the conclusion of the surveys, a quality control check was conducted comparing DOAS spreadsheet data and all daily forms and maps. These were then compared to the hawkcount.org database. Any inconsistencies were corrected with assistance from the surveyors. Scanned copies of all field data forms can be found at <http://www.tinyurl.com/doasbluestone>.

## **WEATHER AND OTHER FACTORS AFFECTING THE SURVEYS**

During 2018 surveys winter weather conditions prevailed, with March being colder than February. There was a northerly component to winds on 13 of 15 days. There were southerly winds on 2 days. Observers documented many eagles using lift along the ridge to the east of the survey site. Many migrants followed a direct path along that ridge. Many non-migrant birds also used the ridge for lift.<sup>1</sup>

During 2019 surveys, temperatures were more variable than the previous season with occasional spring-like temperatures. Wind direction on survey days was similar to 2018, with a northerly component being significant on 14 of 20 days. Often the wind was near to NW. Six days had mostly southerly winds.

During 12 of 130.5 hours of observations, a second observer was present, and contributed to the surveys. With close horizons in every direction, few birds would be missed by a single observer. However, a second observer provides an advantage by being able to track individual eagles. This is helpful when birds are in sight for long periods of time, especially for mapping flight paths. The primary surveyor cannot follow individuals for long periods without the risk of missing other birds.

Surveyors were present in Sanford for 133.25 hours. Adjustments to effort included subtracting 2 hours for fog on 5 March, and a half hour snow white-out on 1 March. Another .25 hour was removed from total effort when the observer went to Page Pond Road to investigate the reason Bald and Golden Eagles were congregating near there on 1 March. While there he photographed 2 Golden Eagles. (Appendix B).

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<sup>1</sup> Addendum To Delaware-Otsego Audubon Society Report on Spring Raptor Surveys in the Proposed Bluestone Wind Project, March 2019

**Figure 1 - Effort**

Date	On Site	Adjustments	Notes	Net Survey Time
02/05/19	7	-2	Fog	5
02/09/19	7			7
02/11/19	7			7
02/14/19	7			7
02/16/19	7			7
02/19/19	3			3
02/22/19	7			7
02/23/19	7			7
02/28/19	7			7
03/01/19	5	-0.25	Page Pond Road	4.75
03/04/19	7			7
03/08/19	7			7
03/09/19	6			6
03/11/19	7			7
03/12/19	7			7
03/14/19	7			7
03/17/19	7.25	-0.5	White out	6.75
03/18/19	7			7
03/19/19	7			7
03/20/19	7			7
Total	133.25			130.5

Effort: 105 total hours March 2018 – 73.5 hours during March 2019.

## **RESULTS**

Surveys were completed on 20 March 2019. As in 2018, eagle numbers were high, and it was at times difficult to determine if the same eagles were being seen repeatedly. Sightings of eagles were recorded as observations. Even if the observer believed he was seeing a repeat individual bird, if there was a significant gap in time between sightings, the bird was recorded as a separate observation with a separately mapped flight path. In these situations, where the observer had a high level of confidence that multiple observations were one bird, the bird retained its originally assigned number. Some Golden Eagles have distinctive plumage (Appendix B). One Golden Eagle (0216-5) was assigned multiple observation lines in the spreadsheet during one observation because its height, distance and behaviors changed. Observation number totals in Figure 3 were adjusted to reflect this being a single bird.

Changes in data recording methods in order to calculate “eagle minutes” resulted in each eagle that perched in the risk area that perched being assigned a separate observation line for each flying event. This raises the number of “observations”. Numbers of observations appear high for days like 14 February when Bald Eagles were clashing throughout the day over a freshly killed deer south of the site.

Eagles observations were lower than 2018. However, if this was a randomly chosen site in the region, the numbers and rate would be considered extraordinary, especially for non-migrant Golden Eagle. In 2019, DOAS observers recorded 172 Bald Eagle observations and 28 of Golden Eagle observations. Those observation totals do not include non-migrant perched birds.

## **DISCUSSION OF MIGRATING RAPTORS**

This discussion is limited to New York State threatened and endangered species. Information on other migrating raptors and vultures can be found at [hawkcount.org](http://hawkcount.org) for the site DOAS – Sanford.

Surveyors submitted migration data daily starting on 22 February. This was chosen as a start date because occasionally adult Golden Eagles are recorded as migrants that early through southwestern Pennsylvania. The protocol instructed surveyors to submit data to [hawkcount.org](http://hawkcount.org) even earlier if a bird fitting the DOAS definition of “migrant” was observed prior to that date. A single Golden Eagle was recorded as a migrant on 22 February. The next migrating eagle was recorded on 11 March.

Judging a migrant can be complicated, and care should be taken in the interpretation of these data. Birds traveling in a migratory direction, going a relatively short distance of several miles, will use the same efficient flight strategy as migrants traveling hundreds of miles. However, non-migrant behavior – movement contrary to the migration, active foraging, perching, certain interactions with other eagles, etc. - are clear indications that the bird in question is not migrating. As a result, some non-migratory birds may be judged migrants because they fit the protocol. It is highly unlikely that a migratory bird would be mistaken for a non-migrant. Thus, any errors resulting from limitations of ability to track birds for long distances, and the constraints of the protocol, will increase migrant numbers and decrease non-migrant numbers.

Due to the additional effort needed to record eagle minutes, surveyors were not asked to record migration data hourly. A daily total of each species and a weather summary was submitted to [hawkcount.org](http://hawkcount.org).

Observations in 2018 were conducted for 105 hours during a 19 day period from 4 March to 22 March. Observations in 2019 included a similar 20 day period from 1 March to 20 March which was

surveyed for 73.5 hours. Passage rates for this period in 2019 are 71% of the rate for Golden Eagles in 2018, and 73% of the rate for Bald Eagles. Figure 2 includes Listed Species observed during those periods.

**Figure 2 - Migrating Listed Species Recorded in March by DOAS Observers**

SPECIES	TOTAL 2018	TOTAL 2019	RATE/HR 2018	RATE/HR 2019
Golden Eagle	22	11	0.21	0.15
Bald Eagle	42	21	0.4	0.29
Peregrine Falcon	2	3	0.02	0.04
Northern Harrier	3	0	0.03	0

In 2019, no Northern Harriers were observed. Three Peregrine Falcons were observed, all judged to be migrants. These birds were all within 200 meters of ground level.

## **DISCUSSION OF NON-MIGRANT EAGLES**

The survey site is 6 miles from a well-known concentration area for Bald Eagles around and below the Cannonsville Reservoir dam. Bald Eagles are present there year round. Large numbers congregate from late fall through early spring. Observers in Sanford reported Bald Eagles had numerous aggressive interactions with other Bald Eagles. They were also observed congregating near Page Pond Road, 2.8 miles north of the site, with 2 Golden Eagles. They were observed perching, flying in small groups and clashing over a dead deer.

On 14 February, Bald Eagles were perching and clashing south of the site in trees along the creek. A driver stopped to and directed the observer to this obvious intense eagle activity where he also observed a deer carcass. Eagles were chasing each other and landing on the ground out of sight. At the end of the survey day, the deer was located. From a distance, it appeared intact. Two days later, on 16 February, an observer saw little eagle activity in this area. On 19 February, the deer was again located and found to be skeletonized.

The deer is assumed to have died after a vehicle impact. Its location was 70 yards away from NY State Highway 41 and 15 or 20 feet lower than the road. To remove such a carcass and eagle attractant would require a great expenditure of energy, and also access to private land.

Golden Eagles were observed making a threatening talon display (between an adult and a first winter bird), an unsuccessful attempt at catching turkeys, diving at prey unseen by the observer,

cooperative hunting between adults, perching, and kiting. Kiting is a hunting method where a bird uses some a combination of lift from the ridge and wind speed to maintain an almost stationary position in the air likened to a toy “kite”. They will drift and move to some degree depending on conditions but try to maintain position. Field notes on four Golden Eagles include mention of Golden Eagle kiting.

Kiting times ranged from brief instances to several minutes. Note: A bird in 2018 spent 14 minutes kiting on the east ridge in 2018. Half of the mapped kiting events in 2018 and 2019 - 5 individual birds - were along the ridge east of the survey site (Appendix A, Map 7). A sixth bird in 2018 that did not have kiting locations mapped was described as kiting on the east ridge. According to the National Wind Coordinating Cooperative, “Certain species (e.g., Red-tailed Hawks and Golden Eagles) that forage for prey in close proximity to turbines appear to have increased fatalities”.<sup>2</sup> Kiting is a foraging activity.

Non-migrant Golden Eagles were observed in 2019 on 9 of 20 days from 9 February to 20 March. As in 2018, some individuals Golden Eagles were in sight of the observer for an extended time – up to 1 hour 29 minutes. An effort was made to identify individual Golden Eagles. Two adults seen together on 9 February were at opposite ends of the light-dark range of adult Golden Eagles. On several occasions, other observed adults were noted as being dark or light. These might be the same birds.

Juvenile birds are more individually distinctive than adults. A first winter juvenile was observed on 1 March with an adult. An older juvenile was also seen well on 17 March. Both of those birds were photographed (Appendix B). In the photographs, the state of feather molt and difference between the birds is easily seen. At a minimum, 4 distinct individuals are winter residents.

Among 16 non-migrant Golden Eagle observations, 4 were juveniles (27%), 11 were adult. Compared to the results of 2018, the demographics differ markedly. During March 2018, 11 of 20 observations of Golden Eagles that were not migrating were judged to be juveniles. The 2018 juvenile observation rate (55%) was double that of 2019. Eastern Golden Eagle expert Dr. Miller commented on the behavior of 2 adults described as “cooperatively hunting” on 9 March 2019: “Behavior suggests wintering pair or winter territoriality. Similar behavior has been observed elsewhere in the east during winter”.<sup>3</sup>

A DOAS observer who left to investigate a congregation of eagles of both species on Page Pond Road photographed the adult and juvenile Golden Eagle at that site (Appendix B). The observer's comment “While on Page Pond Road, 1st winter GE #11 and Ad. GE #5 clashing talons in the air, before flying off to the E with one another” suggests territoriality. If adult birds were defending a winter territory, it might explain the lower 2019 juvenile observation rate. In regards to territoriality, one of the adult birds had distinctive enough plumage that an observer thought it was the same bird seen on 3 different days. Another observer noted very light features on a non-migrant adult. This may have been the same bird.

As noted in the DOAS report for March 2018, the rate of non-migrant Golden Eagle observations in the Bluestone Wind Project area that month is unprecedented for New York State. This season they are less but still extraordinary given how difficult these birds are to find in winter. DOAS organized winter raptor counts in Delaware County during the first weekend of February in 2015 and 2016. The specific goal was to survey Golden Eagles in the Northern Catskill region. A protocol used in the Blufflands area of Minnesota using traveling teams was adapted for these surveys. The DOAS winter surveys compiled

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<sup>2</sup> Wind Turbine Interactions with Birds, Bats, and their Habitats: A Summary of Research Results and Priority Questions

<sup>3</sup> Assessment of Seasonal Status of Golden Eagles Observed in the Bluestone Wind Project Area, Miller 2019



57.74 team/hours of data in 2015 and 45.53 team/hours during 2016. Each year 3 Golden Eagles were recorded, including one each year at a baited site operated by DOAS volunteers. When the baited birds are removed, the rate of Golden Eagle sightings is .038/hour, or 1 for every 26 team/hours. The rate of observations for the 2019 Sanford survey is .115/hour, or 1 every 8.7 hours, 3 times the rate found with teams searching what is considered good winter range in Delaware County.

Another source of comparison for non-migrant Golden Eagle observation rates is the nine days of surveys DOAS conducted 10.8 miles ESE of the Sanford site and south of the Cannonsville Reservoir from 5 March to 14 March 2009.<sup>4</sup> Because the terrain limited visibility, a three site transect was created. It had a view perpendicular to the migration approximately three times as wide as at the Sanford survey site.

There was a surveyor at one or more of the three transect sites during 67.75 hours in 2009. One non-migrant Golden Eagle was documented during that time. At Sanford, surveyors recorded one non-migrant Golden Eagles sighting every 5.25 hours in March 2018 and one every 8.75 hours in 2019. Respectively, this is 13 times and 8 times the number per hour seen south of the Cannonsville Reservoir in 2009.

The March 2018 surveys in Sanford found the highest number of individual non-migrant Golden Eagles ever observed in New York State. A search for records of winter resident Golden Eagles on listservs, in *The Kingbird*, and on eBird found no reports with more than 2 individuals. The 2019 surveys apparently found the second highest number of individual Golden Eagles ever recorded by observers at a site in New York State.<sup>5</sup>

## **DISCUSSION OF EAGLES IN THE RISK ZONE**

The area used to calculate risk is a cylinder comprised of circle with an 800 meter radius and a height of 200 meters above ground level (AGL). Eagle minutes only applies to flying time in that space.

Intense eagle activity such as was observed on 14 February created a data recording problem. Since DOAS observers were recording eagle minutes over a long period of time, birds that flew and perched, landed on the ground, perhaps flew again, all needed to have their times in the high risk zone sorted by behavior. The observers started a new observation line every time a bird changed behavior in the risk zone from stationary to flying, or vice versa. For the number of observations in the report, if a bird did not leave the observer's sight, it was counted as one observation in the total.

DOAS observers recorded data at the site for 130.5 hours. Bald Eagle minutes total 180. Golden Eagle minutes total 45. The bulk of the Golden Eagle minutes are from 3 events involving 4 birds, all of which have field notes describing them as engaged in hunting/foraging behaviors. Those events account for 32 of the 45 Golden Eagle minutes (71%).

There is also highly concentrated Bald Eagle risk minutes. 70% were recorded on 5 of 20 survey days. 82% were recorded on 7 of 20 survey days.

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4 [http://doas.us/wp-content/uploads/2013/04/DELA\\_Eagle\\_Count\\_Report\\_3-09.pdf](http://doas.us/wp-content/uploads/2013/04/DELA_Eagle_Count_Report_3-09.pdf)

5 *The Kingbird*, NYS on-line Birding Lists, 2013-2018, ebird.org

A full discussion of the magnitude of DOAS risk minutes requires reference to two reports produced by Dr. Tricia Miller<sup>6</sup>, and documents and data produced by WEST<sup>7</sup>. The information produced by WEST has been deemed confidential by the developer. A request for its use in this report has not been granted at this time.

As noted above, 3 events accounted for 71% of all DOAS Golden Eagle risk minutes. One of those birds was kiting inside the risk zone, a behavior that can last for minutes, and was more commonly observed near the ridges and further south in the valley (see Maps 6 & 7). DOAS risk minute rates at point 15 are 4 times the rate of WEST minutes for the whole study area<sup>8</sup>. The following issues should be considered in any interpretation of these data:

1. Surveys to provide data for the Bayesian model require sampling of multiple sites for short periods across the project study area. DOAS surveys were stationary counts for many hours at one site intended to capture migrant eagle passage, and detailed eagle behavior.
2. Potential survey sites with good visibility are difficult to find in the project area. The site chosen for DOAS February and March surveys has the best visibility of the WEST survey points<sup>9</sup>.
3. To understand how the numbers of eagles and observation rates found by DOAS at this survey point relate to eagle distribution across the project area, it is necessary to examine WEST eagle rates for all survey points for comparison. This information is in the confidential document *Bluestone Wind Project Net Conservation Benefit Plan*.
4. DOAS only recorded risk minutes in 2019. These surveys were done at a site that had a remarkable concentration of eagles in 2018. The site was originally chosen for good visibility and terrain features that would be expected to concentrate eagles. While DOAS surveys do not represent the whole project area, they do show an intensive use of the area around WEST's survey point 15.
5. The 3 events that included 71% of Golden Eagle risk minutes were observed during 130.5 hours of surveys at site 15. The chance of a surveyor who was sampling sites for the Bayesian model capturing even one of those events is low.

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<sup>6</sup> Review of Bluestone Eagle Data, Miller 2019, & Review of Bluestone Wind Net Conservation Benefit Plan, Miller 2019

<sup>7</sup> Bluestone Wind Project Net Conservation Benefit Plan, WEST - Confidential, Bluestone Wind Project Appendix OO Eagle Data, WEST - Confidential,

<sup>8</sup> Bluestone Wind Avian Risk Assessment (Redacted Version) 2018

<sup>9</sup> Review of Bluestone Eagle Data, Miller 2019

Figure 3 - Observations of Golden Eagles by Distance and Height

	Close/Low	Close/High	Distant/Low	Distant/High	Total
Non-Migrants	7	1	5	4	16*
Migrants	2	3	4	3	12
Totals	9	4	9	7	28*

Close = within 800m of the observer, Low = below 200m above ground height. \* Total adjusted because bird 0216-5 flew in separate zones during one observation. These flights are mapped separately.

Figure 4 - Observations of Bald Eagles by Distance and Height

	Close/Low	Close/High	Distant/Low	Distant/High	Total
Non-Migrants	49	15	41	46	151
Migrants	6	5	1	9	21
Totals	55	20	42	55	172

Close = within 800m of the observer, Low = below 200m above ground height.

## **CONCLUSIONS**

DOAS conducted surveys in 2019 to determine if the high concentrations of Golden and Bald Eagles observed in March 2018 were an annual event, or an aberration. We were confident the juvenile Golden Eagles observed in March 2018 were winter residents since that demographic does not migrate that early. However, questions raised about the seasonal status of adult Golden Eagles needed to be resolved. To gather additional evidence of Golden Eagle winter residence, DOAS started surveys on 5

February 2019. A detailed examination of the seasonal status of Golden Eagles in the project area by Dr. Trish Tricia Miller can be found on the NYSDPS Bluestone Wind Master Matters website.<sup>10</sup>

2019 surveys found:

- High concentrations of resident eagles of both species occur annually in the area around the Sanford hamlet.
- Winter residence by Golden Eagles is well established. Age classes range from first winter to adult.
- Eagles of both species make regular use of the ridge east of the Sanford hamlet in the area of turbines 25, 26 and 29.
- DOAS observers detailed flight paths and behavior for eagles well beyond the 800 meter Bayesian model risk zone. Their notes and detailed maps show behavioral differences in how eagles use higher elevations in the project area, and lower elevations where visibility is better for surveying.

## **INCIDENTAL OBSERVATIONS**

In addition to raptors, observers recorded non-raptor (waterfowl, shorebirds, corvids, and passerines) in numbers greater than 50. In Spring 2019, the majority of incidental wildlife species were American Crow, Canada Goose and Snow Goose. Crows were visible and vocal at the site in smaller flocks of 30-40 almost every day during the survey period.

Strong south winds on March 14 brought the largest migration, with a combined total of 5,000 Canada Goose and Snow Goose. Birds were high and dispersed, in steady streams mostly before 12:00. 150 Red-winged Blackbirds were also observed March 14 and flocked among the trees near the farm north of the site most of the day.

Details, including the height and distance, can be found on the daily Incidental Wildlife Forms for each date at the web link below.

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<sup>10</sup> <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=16-F-0559>

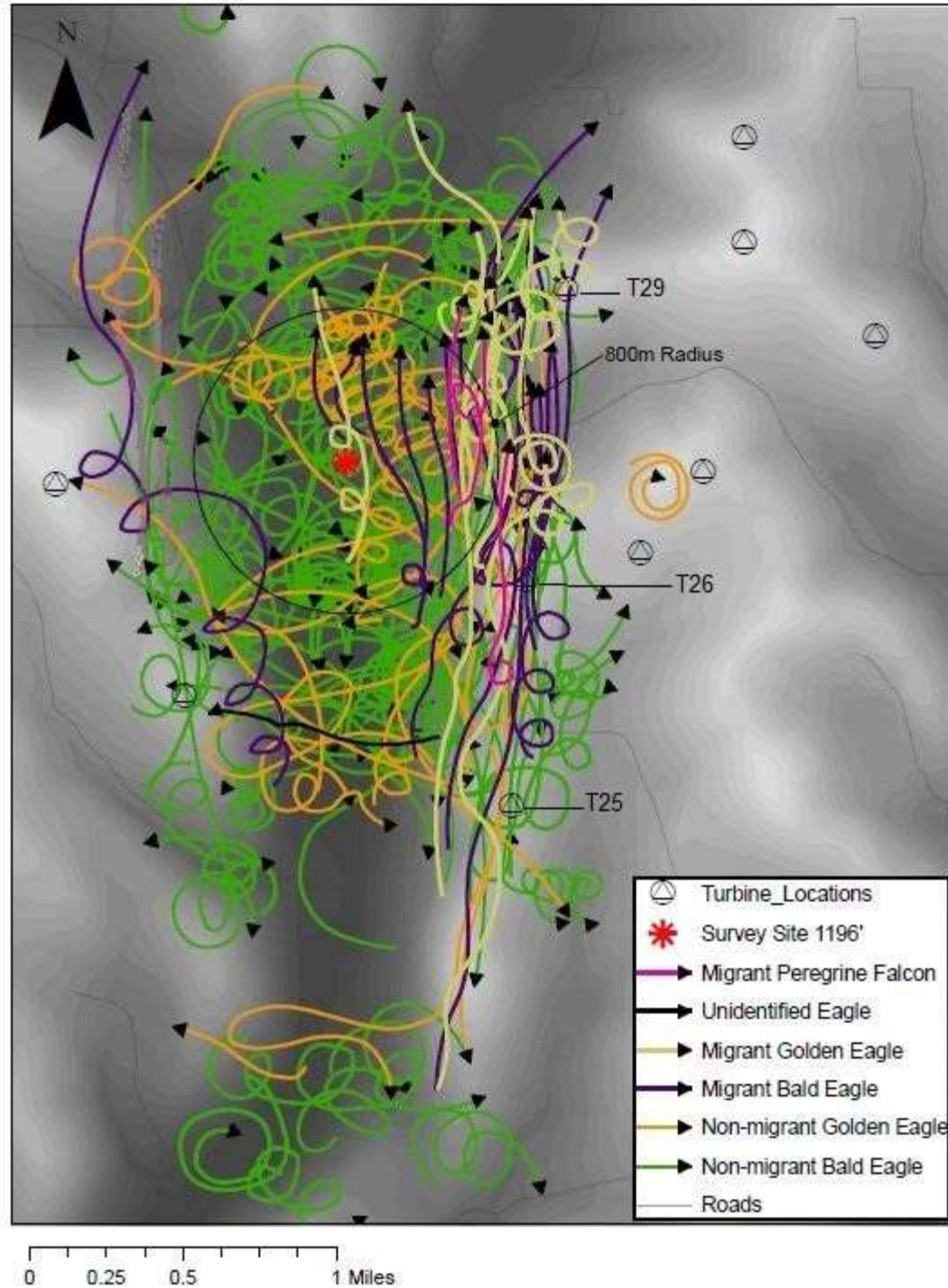
**Figure 5 - Incidental Species Observed**

Date	Species	Number-Behavior, Height ( <b>low in bold</b> )	Wind Dir, Speed (Beaufort)
Feb 9	American Crow	<b>89 - perched, low</b>	NW, 2-5
Feb 14	American Crow	<b>108 -perched, low</b>	NW, 1-3
March 11	Canada Goose	180 - migrating, <b>60 were low</b>	NW-NNW, 2-4
March 11	American Crow	<b>70 - low, agitated by RTHA</b>	NW-NNW, 2-4
March 14	Canada Goose	4,000 - migrating - high	SSW-SSE, 3-5
March 14	Snow Goose	1,000 - migrating - high	SSW-SSE, 3-5
March 14	Red-winged Blackbird	<b>150 - flocking - low</b>	SSW-SSE, 3-5
March 18	Snow Goose	165 - flocking - high	NW, 1-3
March 20	Canada Goose	<b>200 - migrating - low</b>	S, 2-4

## Appendix A - Flight Path Maps

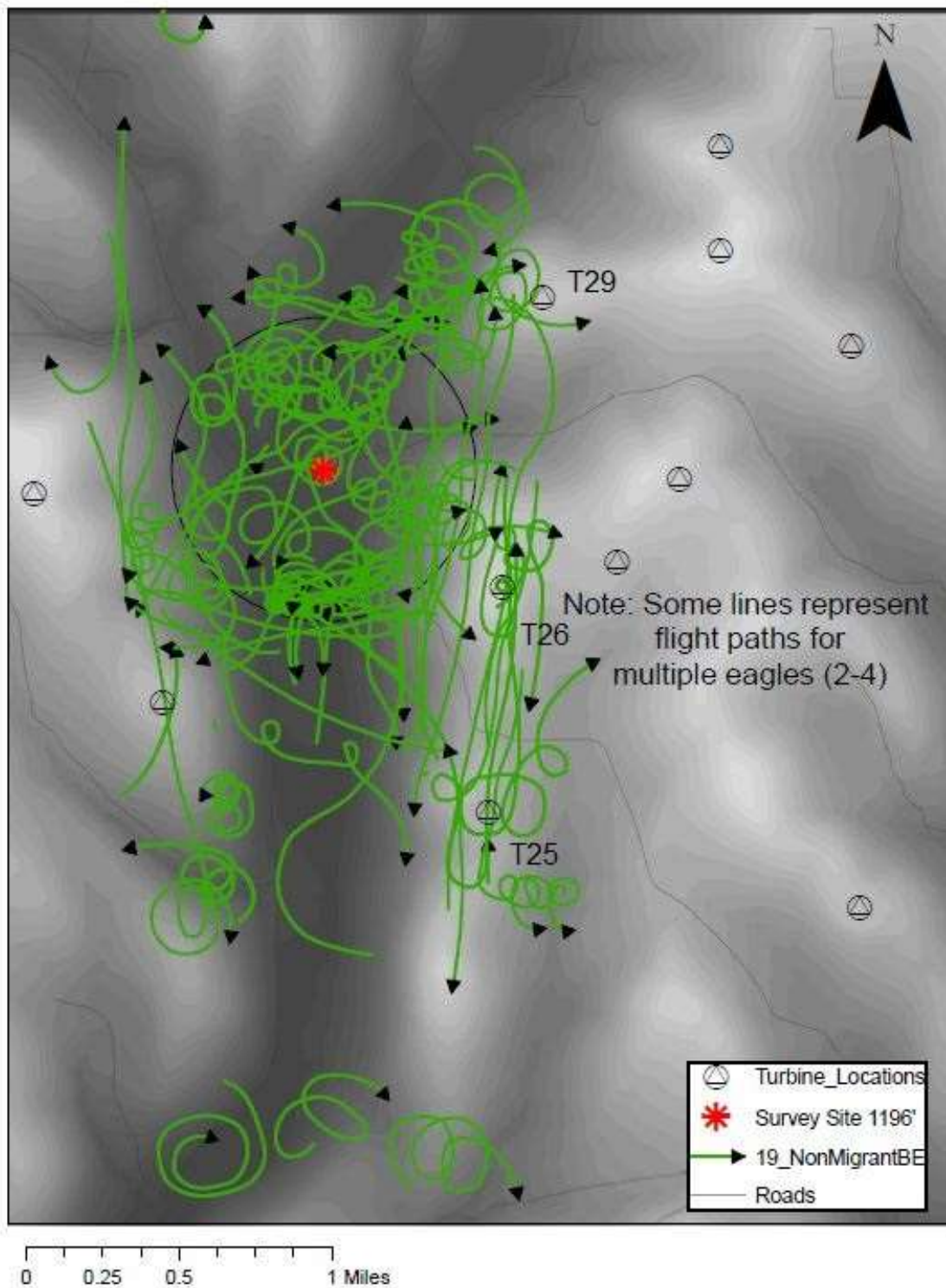
### All 2019 Documented Flight Paths

n = 204



Map 1 - All 2019 Flight Paths of NYS Listed Species

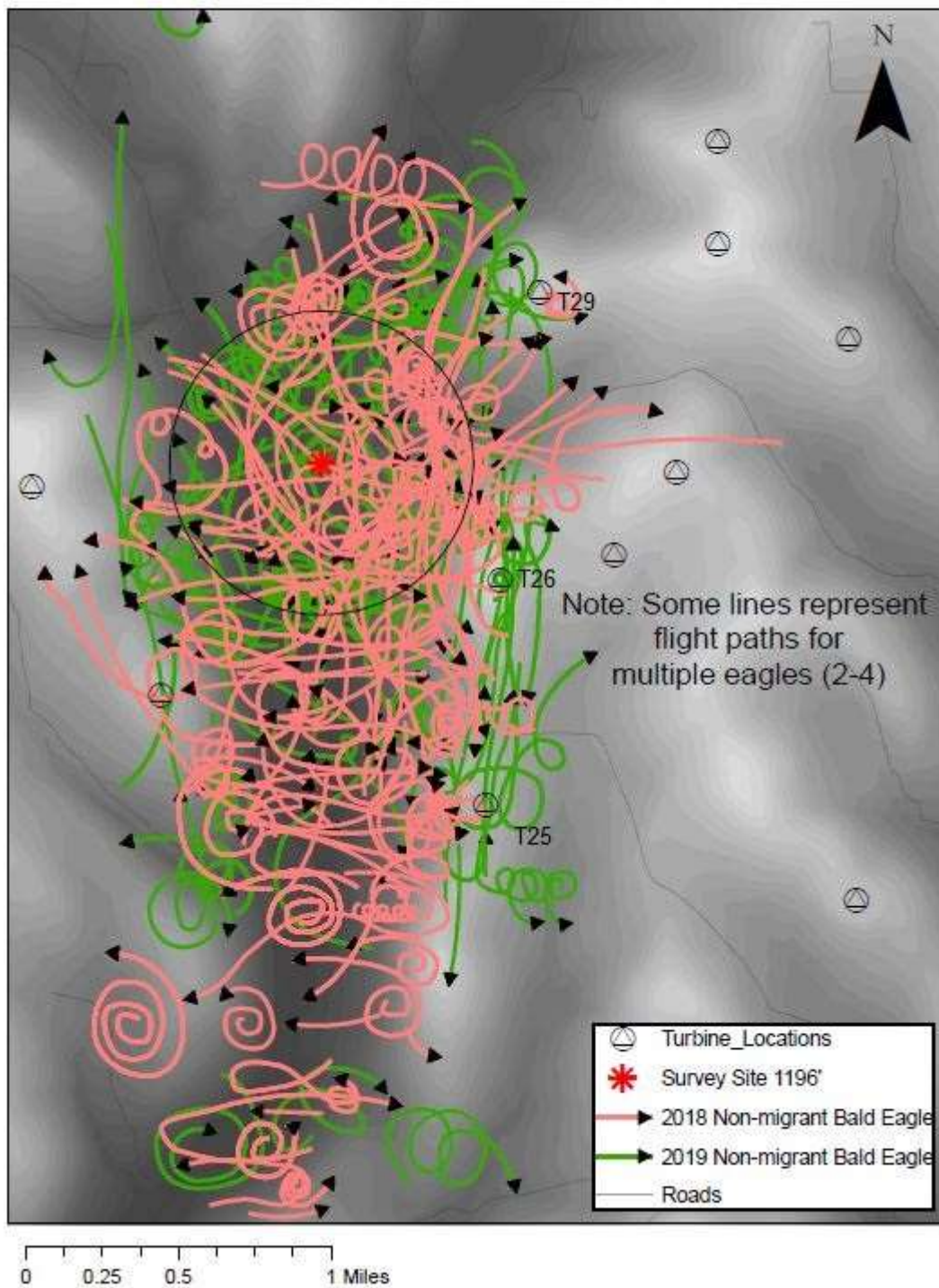
FLIGHT PATHS OF NON-MIGRATING BALD EAGLES  
OBSERVED WITHIN 200m OF GROUND LEVEL IN 2019, n = 90



Map 2



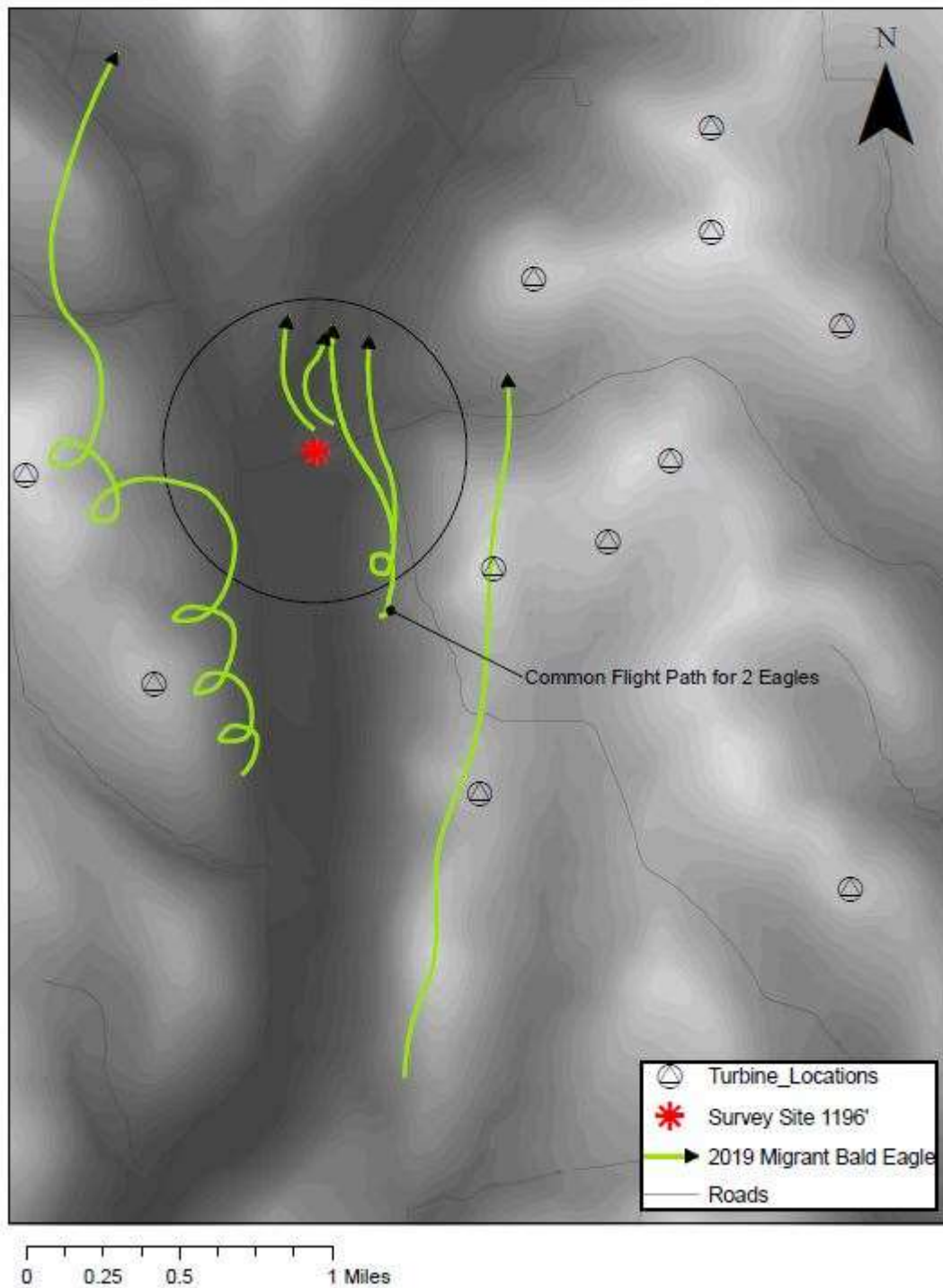
COMBINED 2018 & 2019 FLIGHT PATHS OF  
NON-MIGRATING BALD EAGLES OBSERVED  
WITHIN 200m OF GROUND LEVEL, n = 250



Map 3

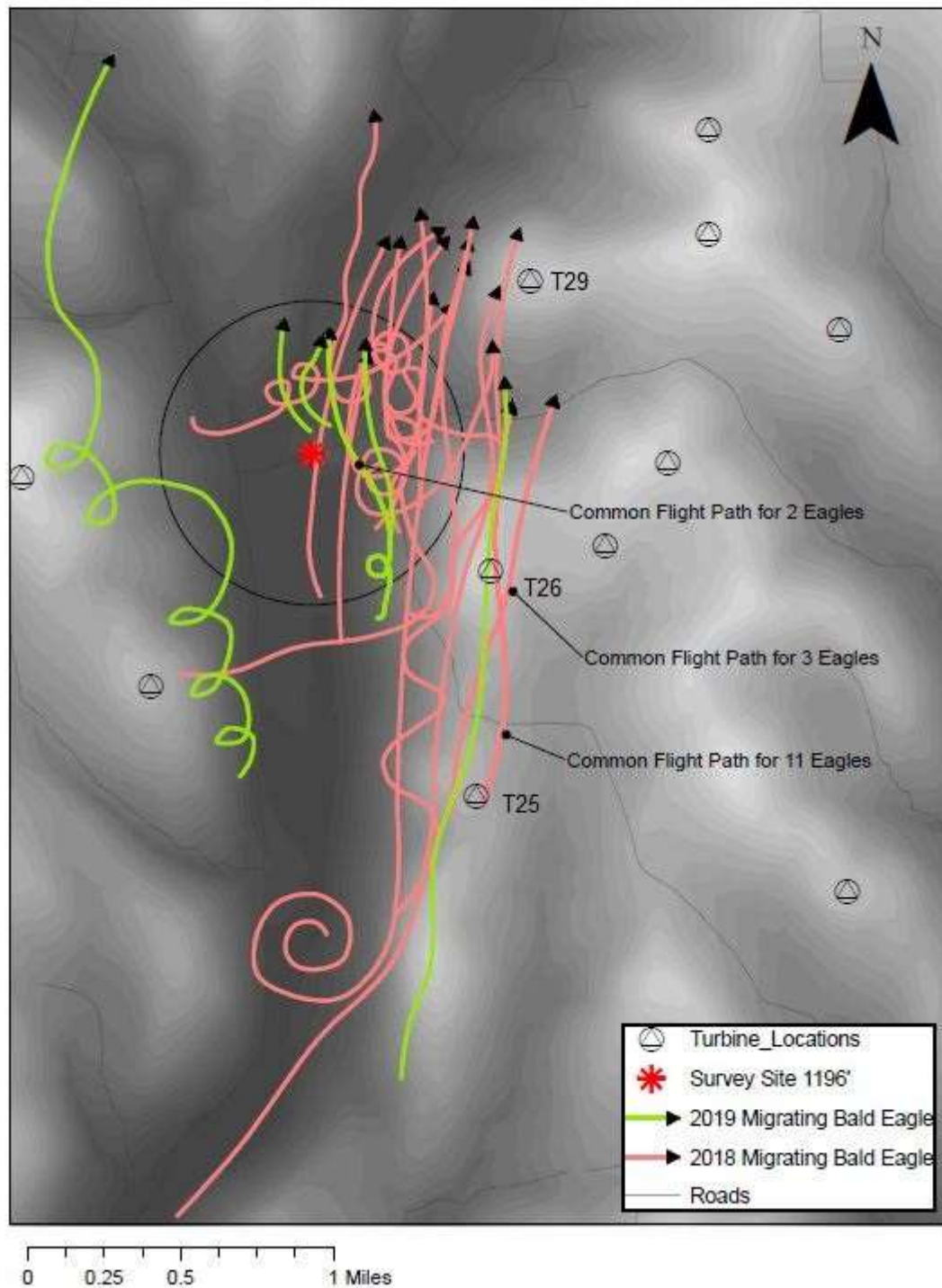


FLIGHT PATHS OF MIGRATING BALD EAGLES  
OBSERVED WITHIN 200m OF GROUND LEVEL IN 2019, n=7



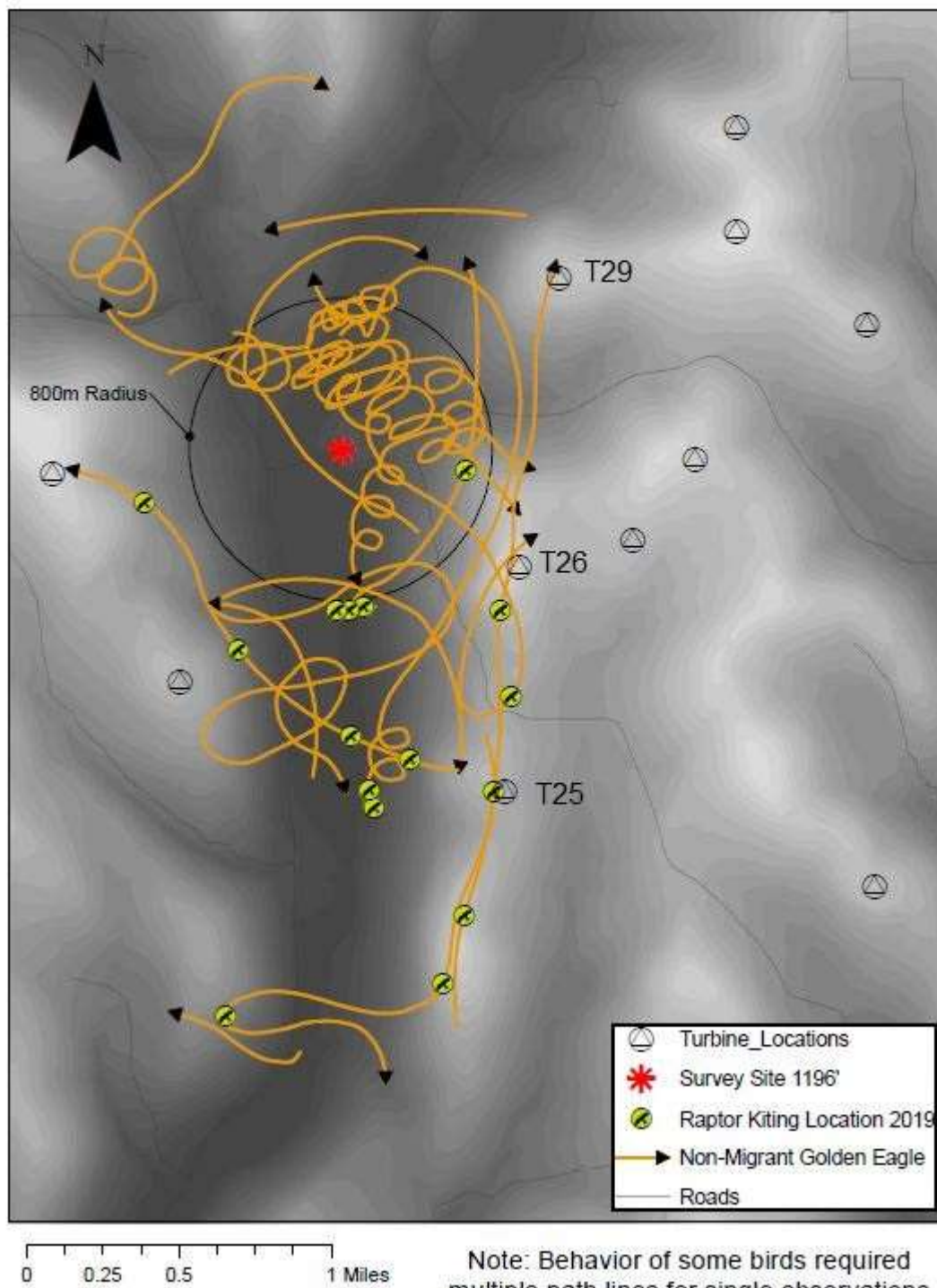
Map 4

COMBINED 2018 & 2019 FLIGHT PATHS OF MIGRATING  
BALD EAGLES OBSERVED WITHIN 200m OF GROUND LEVEL , n = 36



Map 5

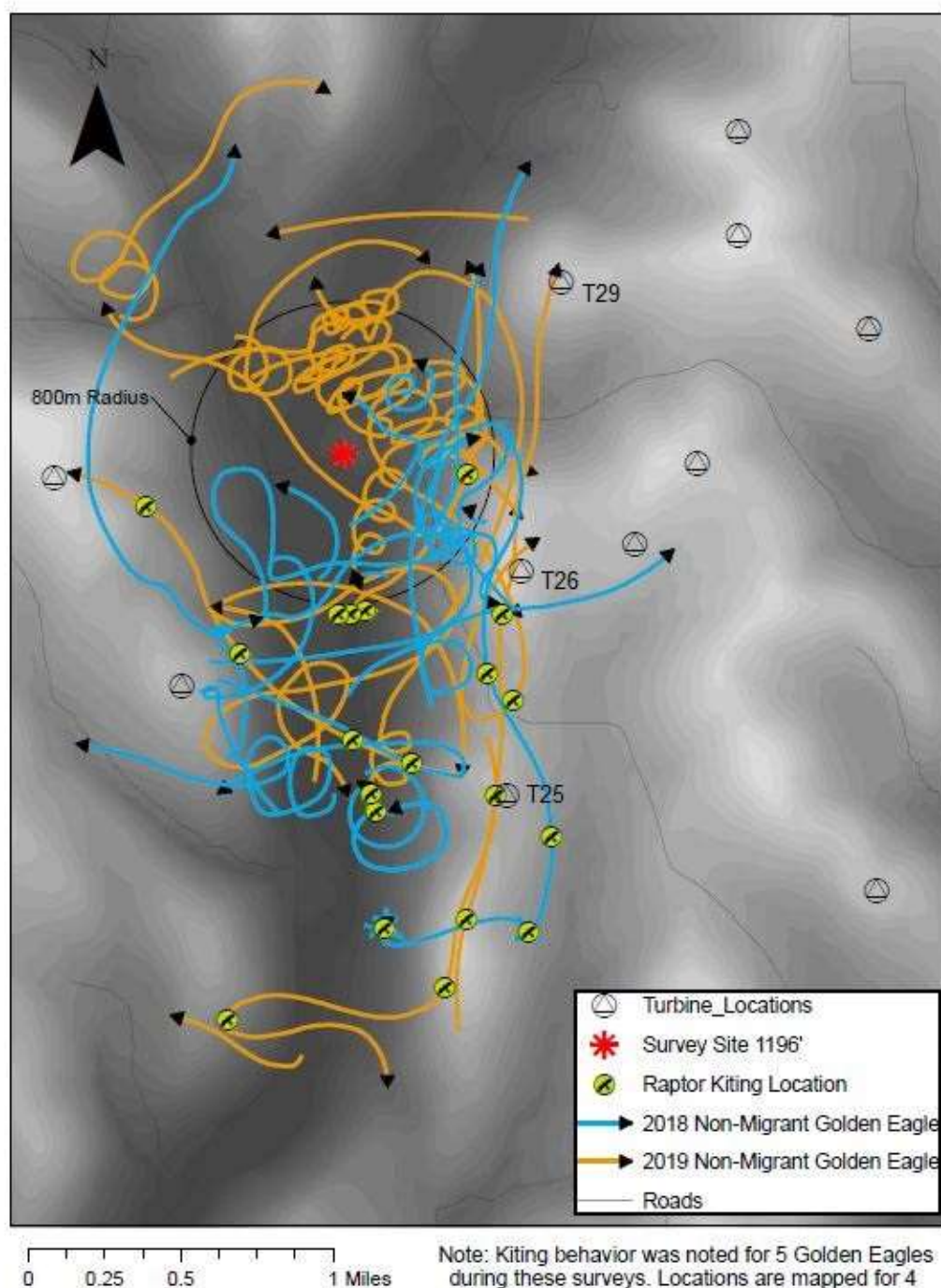
FLIGHT PATHS OF NON-MIGRANT GOLDEN EAGLES  
OBSERVED WITHIN 200m OF GROUND LEVEL  
BY DOAS OBSERVERS IN 2019, n = 10



Map 6



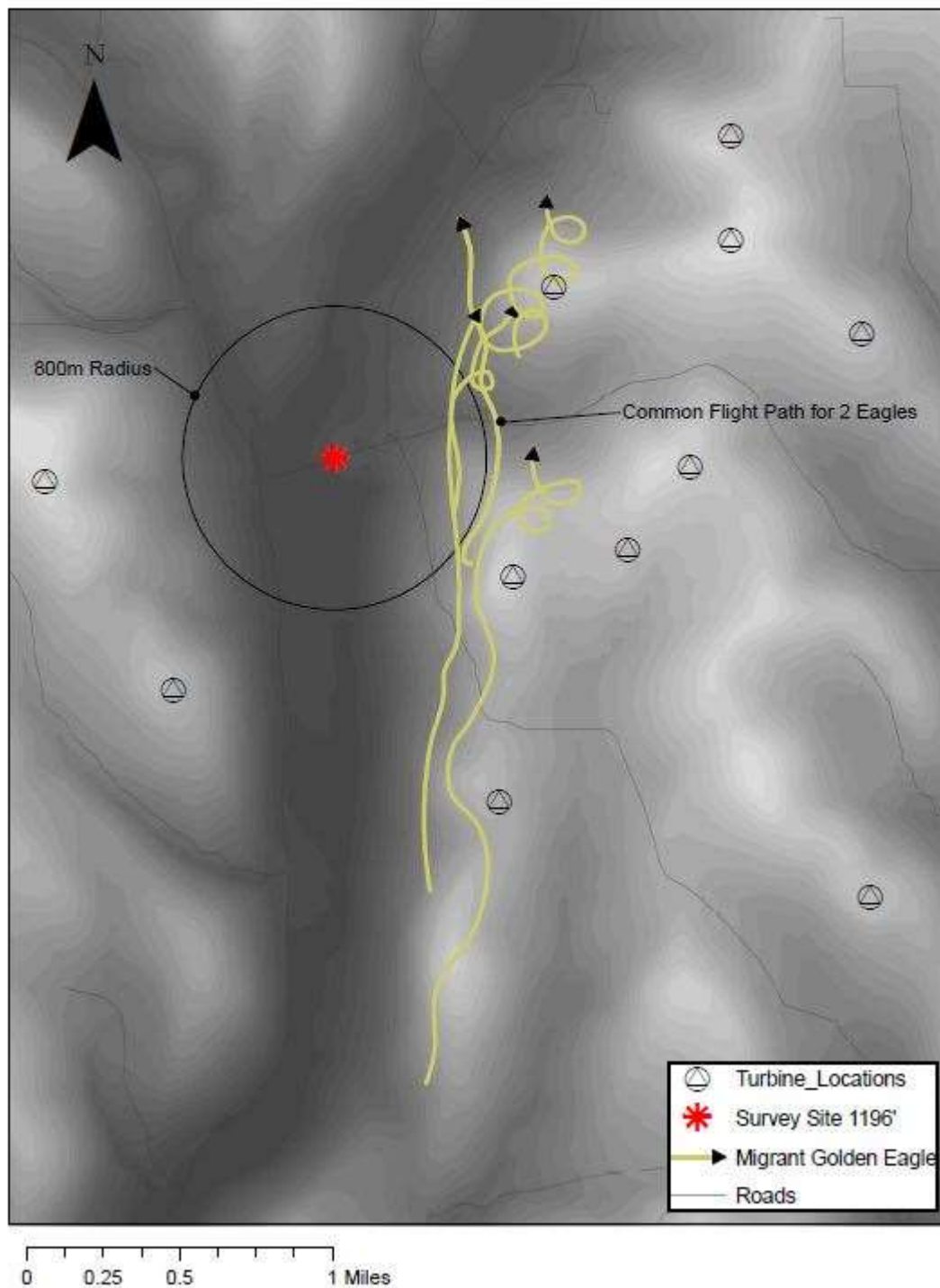
COMBINED 2018 & 2019 FLIGHT PATHS OF  
NON-MIGRANT GOLDEN EAGLES OBSERVED WITHIN  
200m OF GROUND LEVEL, n = 29



Note: Kiting behavior was noted for 5 Golden Eagles during these surveys. Locations are mapped for 4 of those birds. Observer notes regarding the 5th bird read: "1st winter bird observed actively hunting/kiting around treetops for over 2 hours."

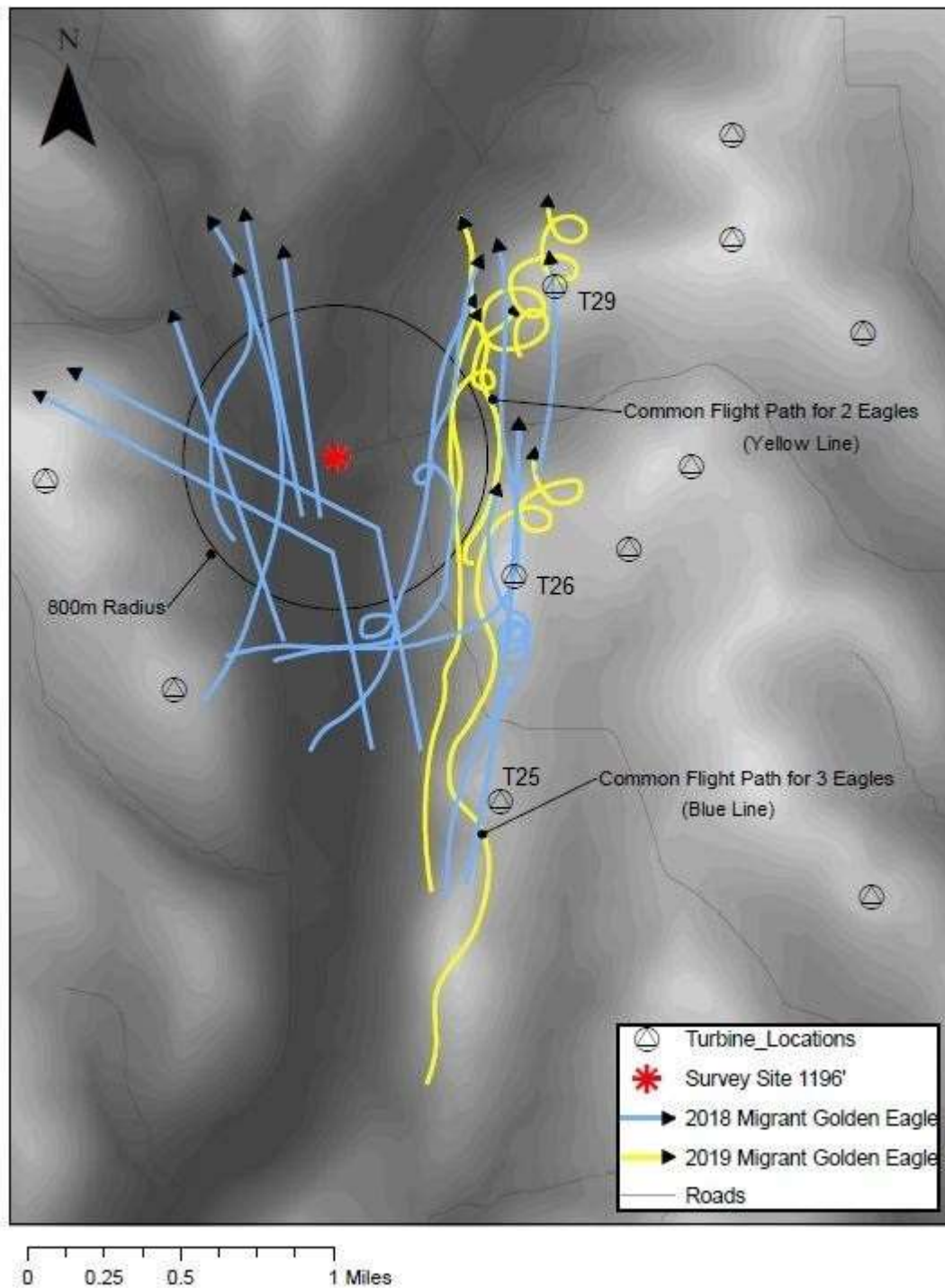
Map 7

FLIGHT PATHS OF MIGRATING GOLDEN EAGLES  
OBSERVED WITHIN 200m OF GROUND LEVEL  
BY DOAS OBSERVERS AT THE SANFORD  
SURVEY SITE IN 2019, n = 6



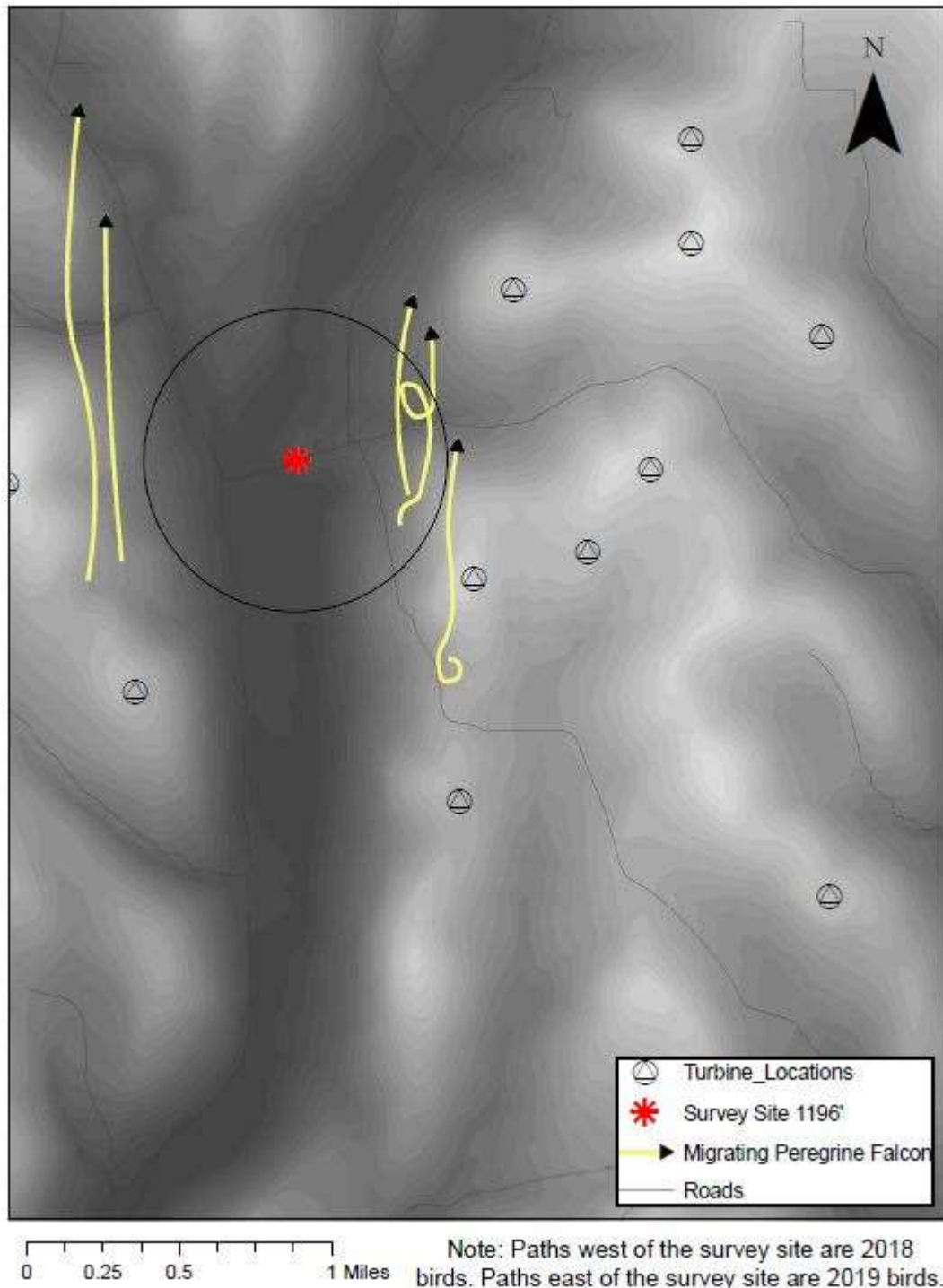
Map 8

COMBINED 2018 & 2019 FLIGHT PATHS  
OF MIGRATING GOLDEN EAGLES OBSERVED  
WITHIN 200m OF GROUND LEVEL, n = 21



Map 9

FLIGHT PATHS OF MIGRATING PEREGRINE FALCONS  
OBSERVED WITHIN 200m OF GROUND LEVEL  
BY DOAS OBSERVERS AT THE SANFORD  
SURVEY SITE DURING 2018 & 2019, n = 5



Map 10



## **Appendix B - Sanford Non-migrant Golden Eagle Photographs**



Photo 1 - Golden Eagles near Page Pond Road in Sanford 1 March 2019. The observer left the survey site to investigate a congregation of eagles. The adult on the left and first winter bird on the right engaged in an aggressive interaction “clashing talons in the air”. The first winter bird was aged by the observer based upon a dorsal view showing a lack of bleaching of upper wing coverts. The lack of any molted flight feathers, as evidenced by their even lengths in this photograph, confirms that age class.





Photo 2 - Older juvenile Golden Eagle being chased by a crow, photographed from the survey site. Note less white is visible in the wings than the first winter bird. This bird has molted some central tail feathers - visible in Photo 3 below.



Photo 3 - A dorsal view of the bird in Photo 2 showing molted central tail feathers (dark feathers) and bleached upper wing coverts. This is either a second or third winter bird.

## **Appendix C – Survey Protocol**

### **DOAS Late Winter/Spring 2019 Raptor Migration Survey Protocol for the Bluestone Project Study Area**

DOAS Raptor Surveys will consist of counts of raptors at a fixed-point location in the project study area. Surveys will be conducted on 10 days in February, and 15 days during the first 3 weeks of March. Days will be chosen based on favorable weather conditions. Surveyors will avoid days with heavy or persistent rain, or any condition that would significantly limit visibility.

The survey site (42.103105° -75.479114°) has been used by both DOAS and WEST in prior seasons. It provides a reasonable - albeit low elevation - view to the south (towards the oncoming spring flight). Surveys will cover 7 hours each day, with the option of an additional hour should birds be flying persistently. Surveys will be planned to start at 0900 hours EST. Weather conditions may determine a different start time. Ideally, full coverage will take place between 0900 and 1500. All data recording will be done in 24 hour format.

Details on every individual of 4 NYS listed species - Bald Eagle, Golden Eagle, Northern Harrier and Peregrine Falcon – will be recorded on a daily data form and a daily map. This will include flight paths drawn on the map. Each bird will be assigned a sequential number on the form, also to be referenced on the map. Data for individual birds will include: 1) species; 2) age; 3) time of first observation (EST); 4) distance from observation site (closer or farther than 800m); 5) detailed times when each bird is **flying** within both 200 meters AGH and 800 meters of the observer recorded (recorded as hour and minute start and end times – note **perched** times to be recorded separately); 6) height above ground level within the 800 meter radius circle (higher or lower than 200m), or for distant birds, at the time of closest observation; 7) migrant vs. “local”; and (8) notes on behavior. **Birds that are seen both perched and flying within 800 meters will have the times of each behavior recorded by the minute.** Additional lines should be used to record data for birds that both fly and perch within the 800 meter radius circle. Any observer comments or unusual observations will be also noted on the bottom or back of the form.

For the purpose of this study, “local” will only mean the bird was not migrating.

The field map will be an adapted USGS topo map. It will be marked with the survey location and an 800 meter radius circle.

Eagle migration in our region is typically from SW to NE in spring. Weather conditions and terrain will affect the exact direction birds are moving at any time. For this study migratory behavior will be defined as a bird moving persistently or deliberately in a direction ranging from N to E. If a consistent flight is noted slightly outside that directional range, surveyors may use their own judgment to determine if the birds are migrating. Stalling briefly to look for prey will not cause a bird to be excluded from the migratory bird count.

On days with high migratory movement, migrants will be deliberately moving in a migratory direction. This minimizes the possibility that birds may be double counted. “Local” birds may also move in a migratory direction. To prevent double counting, surveyors will note distinguishing characteristics of birds passing the site, i.e. multiple birds together, missing feathers, age, state of molt, etc. Using that information, any birds counted as migrants that are then judged to have returned to the area, will be removed from the migrant count and reassigned the designation of “local” birds.

“Local” birds will be defined as those moving in directions outside the migratory directional range, those making significant changes of direction, those engaged in extended kiting or hunting behavior, and perched birds. If there is a question about whether a bird is a migrant or local bird, it will be recorded as a local bird.

Local birds may appear multiple times during a survey day or week. An effort will be made to identify individual birds, especially Golden Eagles. Detailed plumage notes will be recorded for each Golden Eagle. Efforts will be made to identify these individual eagles when Golden Eagles are seen subsequently.

If it is difficult to distinguish between individual non-migrant Bald Eagles due to high numbers of birds, observers will document “sightings”, assigning new numbers to individuals even though this may include possible multiple views of a single bird during a day. Clear notes should indicate that these are possible repeat “sightings”.

Surveyors will record basic weather data each day (high/low temps, high/low/average wind speed, wind direction, cloud cover, precipitation, and notes on any significant changes such as any cold or warm fronts passing through, or any low cloud ceiling heights that could impact the survey.

### **Hawkcount.org submissions:**

Prior to February 22, migrant raptors are not expected. Data will be submitted to the hawkcount.org database during that period only on days when migrating raptors are observed. Starting February 22, a submission to hawkcount.org will be made daily showing the number of migrant raptors and vultures observed. Submissions to hawkcount.org may be done with the “daily” (vs “hourly”) function. The count of any migrants not listed on the daily data form will be recorded - and placed in the same 200m height and 800m distance fields as listed birds - on the back of that form.

• When species cannot be determined, birds will be recorded as one of the following categories:

- unknown raptor (UR)
- unknown buteo (UB)
- unknown accipiter (UA)
- unknown eagle (UE)
- unknown falcon (UF)

Daily Form data, and that for hawkcount.org will be entered on-line at the end of each day, or as soon as possible.

### **Additional data recording:**

If state or federally listed species, or large flocks (greater than 50 individuals) of other bird types (i.e., waterfowl, shorebirds, corvids, and passerines) are observed during the surveys, they

will be recorded on an incidental wildlife observation data sheets. The data recorded are similar to those described above, including observation number, date, time, species, number of individuals, distance and height from observer, sex/age class, habitat, and any noteworthy behavior.

After hawkcount.org data entry, all field sheets (map, daily data sheet, incidental observation sheet) will be stapled together and submitted to Andrew Mason or Thomas Salo. These documents will be scanned and made available to interested parties. Data from these documents will be summarized in a final report.

#### Quality checks:

- After data entry, surveyors will confirm that listed species on the daily data sheet have been entered correctly according to distance and height.
- After submission of the field forms, a qualified individual other than the surveyor will review each day's data for errors.

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## Appendix D - Listed Species Form Data

	Data Notes and Abbreviations
<b>Bird ID</b>	Birds are numbered with date (mmdd) and number. e.g. 0311-5 means 5th bird seen on March 11. Changes in location or behavior (e.g., from "Flapping" to "Perched") for the same bird are noted with 'a' 'b' etc. For example see Juv BE 0211-1a, 1b. It changed from "Gliding" low to "Perched".
<b>Species</b>	GE= Golden Eagle; BE = Bald Eagle; NH = Northern Harrier; PG = Peregrine Falcon
<b>Age</b>	Ad = Adult (includes sub-adult); Juv = Juvenile; Unk = Unknown
<b>Time 1st Observed</b>	Time in EST first observed.
<b>Ht +/- 200m (high/low)</b>	"High" or "Low" for birds above or below the 200m Above Ground Level threshold where the bird is observed. Birds observed in low airspace will be recorded as such, even if it flies higher.
<b>Dist +/- 800m (far, close)</b>	"Close" for any bird that comes within 800 meters of survey site. "Far" otherwise.
<b>Time start &lt;800m Time end &lt;800m</b>	For any "Low" bird, time in EST the bird is first observed within 800m of the site, and time the bird is last seen within the 800m.
<b>Migrant</b>	Yes or No. (No = "Local")
<b>Behavior</b>	P = Perched; S = Soaring; Flap = Flapping; For = Foraging; G = Gliding; P = Perched; S = Soaring; Flap = Flapping; For = Foraging; G = Gliding; A = Aggression or Territorial Defense; O = Other to be recorded as field notes.

Bird ID	Species	Age	Time 1st observed	Ht +/- 200m (H/L)	Dist +/- 800m (F, C)	Time start <800m	Time end <800m	Migrant Y/N	Behaviors	Field Notes
0205										No eagles observed.

0216-5	GE	Ad	10:16	H	C			N	For, S, G, P, Flap	Ad GE, extremely bright gold head, possible same bird from 2/9. Kiting initially on flight N from valley, in sight for 10 min. Came back into view from N over barn, perched along W ridge. Later buzzed by Ad BE, switching to dead snag along E ridge. Took off at 11:25, kiting across E to W until going out of sight over W ridge (in view 15 min). Returned at 12:12 from S, glided back to W ridge from valley, perched in evergreen. Visible clearly in tree for 54 min. Left S along ridge and would not return. In sight for 10 min before disappearing for good. Total amount in view: 1hr 29min. (Took digiscope photo for documentation purposes)
0216-5	GE	Ad	10:56	L	C	10:56	11:04	N	For, S, G, Flap	Kited - same bird #5
0216-5	GE	Ad	10:16	L	F			N	For, S, G, P, Flap	Ad GE, extremely bright gold head, possible same bird from 2/9. Kiting initially on flight N from valley, in sight for 10 min. Came back into view from N over barn, perched along W ridge. Later buzzed by Ad BE, switching to dead snag along E ridge. Took off at 11:25, kiting across E to W until going out of sight over W ridge (in view 15 min). Returned at 12:12 from S, glided back to W ridge from valley, perched in evergreen. Visible clearly in tree for 54 min. Left S along ridge and would not return. In sight for 10 min before disappearing for good. Total amount in view: 1hr 29min. (Took digiscope photo for documentation purposes)
0209-1	GE	Ad	09:56	L	C	09:56	10:03	N	For, flap, G, S	Adult bird, bleached upper wing coverts, extremely light/golden head. Hunting cooperatively with GE #2, low over fields to N, then over barn, actively foraging until catching lift off E ridge and dispersing E. Same scope field as GE #2 for majority of time seen. Potential pair?
0209-2	GE	Ad	09:57	L	C	09:57	10:03	N	For, flap, G, S	Adult bird, noticeably darker than GE #1, easily distinguishable from one another. Much darker in the head. Potential pair?
0209-3	BE	Ad	12:38	L	C	12:38	12:41	N	Flap, G, S	Adult bird, came into view low from the N, flew almost directly overhead, quickly caught lift off E ridge, soared S along ridge. Matching white secondary wing feathers
0211-1	BE	Ad	09:20	L	C	09:20	09:23	N	Flap, G, P	Perched @ 9:24 outside 800m. Same Ad BE from 2/9 - notable white secondary feathers. Seen at close range both 2/9 and 2/11. Behaved similarly both days, appearing out of the N
0211-1	BE	Ad	10:25	L	F			N	Flap, G	Took flight from perch at 10:25, flew N along W ridge out of sight
0214-10a	BE	Juv	12:39	L	F			N	S, G, P	With 9
0214-10b	BE	Juv		L	C	13:18	13:20	N	F, A	
0214-11a	BE	Ad	13:20	L	C			N	P	

0214-11b	BE	Ad		L	C	14:20	14:20	N	F	Moved to new perch ~100M
0214-12a	BE	Ad		L	C	13:24	13:26	N	S	Went to perch.
0214-12b	BE	Ad		L	C	13:32	13:33	N	F, A	Interacted with 13. Perched again.
0214-13a	BE	Ad		L	C	13:32	13:33	N	F, A	interacted with 12. Perched.
0214-13b	BE	Ad		L	C	13:54	13:55	N	F	Exited 800M. Perched.
0214-14	BE	Ad	14:46	L	F			N	S, G	Not Mapped
0214-1a	BE	Juv	10:34	L	C	10:34	10:35	N	G	Tail resembles a golden. Flew to perch by stream.
0214-1b	BE	Juv	11:34	L	C			N	P	
0214-1c	BE	Juv		L	C	11:42	11:45	N	F	Chased by 3.
0214-2a	BE	Ad	11:31	H	F			N	G, S	3 has a distinct dihedral. 2a and 3a interacted, flew together, spilt.
0214-2b	BE	Ad		L	C	11:42	11:45	N	F	Landed on ground beyond stream.
0214-2c	BE	Ad		L	C	11:52	11:53	N	F,S	
0214-3a	BE	Ad	11:36	H	F			N	G,S	3 has a distinct dihedral. 2a and 3a interacted, flew together, spilt.
0214-3b	BE	Ad		L	C	11:42	11:45	N	F, A	Chased 1 off perch, chased it until out of sight.
0214-4	BE	Ad	12:12	L	F			N	F, S, G	
0214-5	BE	Ad	12:17	L	F			N	S, G	5-8 together. All spotted by casual 2nd observer. Would have been missed otherwise. Distant birds were included for NYSDEC mapping purposes.
0214-6	BE	Ad	12:17	L	F			N	S, G	5-8 together. All spotted by casual 2nd observer. Would have been missed otherwise. Distant birds were included for NYSDEC mapping purposes.
0214-7	BE	Ad	12:17	L	F			N	S, G	5-8 together. All spotted by casual 2nd observer. Would have been missed otherwise. Distant birds were included for NYSDEC mapping purposes.
0214-8	BE	Ad	12:17	L	F			N	S, G	5-8 together. All spotted by casual 2nd observer. Would have been missed otherwise. Distant birds were included for NYSDEC mapping purposes.
0214-9a	BE	Ad	12:39	L	F			N	S, G, P	With 10
0214-9b	BE	Ad		L	C	13:18	13:20	N	F, A	
0216-1	BE	Ad	09:13	L	F			N	Flap, P	P @ 9:14
0216-1	BE	Ad	09:19	L	C	09:24	09:29	N	Flap, G, S	

0216-10	BE	Ad	14:29	H	C			N	S, P	P @ 15:02
0216-2	BE	Ad	09:18	H	C			N	G, S	
0216-3	BE	Ad	09:40	H	F			N	Flap, G, S	Birds 3-4 flying together
0216-4	BE	Ad	09:50	H	F			N	Flap, G, S	Birds 3-4 flying together
0216-6	BE	Ad	11:14	L	C	11:14	11:16	N	S, G	Buzzed perched GE - Note: on map, #6 heads N then turns E into 800m radius circle. The multiple lines make the path difficult to follow.
0216-7	BE	Ad	13:43	H	C			N	G, S	BE with matching white secondaries. Appears to be same bird from 2/9, 2/11
0216-8	BE	Ad	14:29	H	C			N	S	
0216-9	BE	Juv	14:29	H	C			N	S	
0219-1	BE	Ad	10:25	L	F			N	G	13 Snow Buntings, 2 RT, 1 TV, 50 American Crows, 4 extremely distant eagles-to south (not included in count), together about 11:45, 2 Ravens, 21 Rock Pigeons. Deer carcass in field south of the creek first seen by TS 2/14 still visible, very little remains.
0219-2	BE	Juv	11:35	H	F			N	G, Flap	
0219-3	BE	Ad	11:53	L	F			N	G, S	
0219-4	BE	Juv	12:03	H	F			N	A, Flap	#4 & 5 interacting
0219-5	BE	Juv	12:03	H	F			N	A, Flap	
0219-6	BE	Ad	12:44	H	C			N	S, G	
0219-7a	BE	Juv	12:47	L	C	12:47	12:49	N	G	Perched at 12:49
0219-7b	BE	Juv	12:52	L	C	12:52	12:53	N	O	Flew about and to ground
0222-1	BE	Ad	09:12	L	F			N	P	Snag on far se slope; left at 9:30
0222-10	BE	Ad	11:30	H	F			N	Flap, S	Over south east ridge, circling up, diving, interacting, headed south.
0222-11	BE	Ad	11:55	L	C	11:55	12:26	N	P	sat on pine below ridge above blind.
0222-12	GE	Ad	12:50	L	C	12:50	12:51	Y	G, Flap	Glided along east ridge , circled once over Loomis/Shaver Rd, kept going north. Very dark, good view of tawny shoulders.
0222-13	BE	Ad	14:15	L	F			N	P	Same position as #4 earlier on west ridge above yellow house. still there when I left for the day.
0222-2	BE	Ad	09:30	L	C	09:30	09:36	N	Flap, G	Interacting 2&3, circling up and flying together, then came up east ridge below tree line, went east over Loomis Hill Rd.



0222-3	BE	Ad	09:30	L	C	09:30	09:36	N	Flap, G	Interacting #2&3, circling up and flying together, then came up east ridge below tree line, went east over Loomis Hill Rd.
0222-4	BE	Ad	10:01	L	F			N	P	On tree top of west ridge beyond yellow house. Hung out at least 30 min.
0222-5	BE	Juv	10:30	H	F			N	S, Flap	#5&6 circling up high, interacting. Joined by one Ad BE.
0222-5a	BE	Juv	10:41	L	C	10:45	10:48	N	S, Flap	Ad flying with 2 Juv BE mid ridge, then disappeared east.
0222-5b	BE	Juv	10:50	L	C	10:50	10:52	N	Flap	interacting with each other, flying along low edge of field near creek, in and out of trees then went south.
0222-6	BE	Juv	10:30	H	F			N	S, Flap	#5&6 circling up high, interacting. Joined by one Ad BE.
0222-6a	BE	Juv	10:41	L	C	10:45	10:48	N	S, Flap	Ad flying with 2 Juv BE mid ridge, then disappeared east.
0222-6b	BE	Juv	10:50	L	C	10:50	10:52	N	Flap	interacting with each other, flying along low edge of field near creek, in and out of trees then went south.
0222-7	BE	Ad	10:41	L	C	10:41	10:45	N	P	In large pine below ridge, above turkey blind in field.
0222-7a	BE	Ad	10:41	L	C	10:45	10:48	N	S, Flap	Ad flying with 2 Juv BE mid ridge, then disappeared east.
0222-8	BE	Ad	11:15	L	C	11:15	11:25	N	P	sat on pine below ridge above blind.
0222-9	BE	Ad	11:30	H	F			N	Flap, S	Over south east ridge, circling up, diving, interacting, headed south.
0223-1	BE	Ad	10:45	L	F			N	P, Flap, S	left perch @ 11:26, flying with BE #2 (see below)
0223-10	GE	Ad	14:44	L	F			N	G, S	Picked up in knotch, scope views revealed adult GE, by patterns on tops of wings, gold head, long tail. Out of view behind ridge as quickly as it came into view.
0223-11	BE	Juv	15:04	L	C	15:04	15:13	N	For, G	
0223-2	BE	Ad	11:26	H	F			N	G, S	flying with BE #1 @ 11:56 far to S
0223-3	BE	Juv	11:54	L	F			N	For, G, S	
0223-4	BE	Unk	11:57	L	F			N	G, S	Picked up far to the south, barely visible even in scope, silhouetted bird amongst other BE
0223-5	BE	Ad	12:54	L	F			N	P	
0223-5	BE	Ad	13:23	L	F			N	S, G	first located perched, took flight at 13:23

0223-6	BE	Juv	13:18	L	F			N	G, S	
0223-7	BE	Juv	13:18	L	F			N	G, S	
0223-8	BE	Juv	14:42	L	C	14:46	14:48	N	S, Flap	
0223-9	BE	Juv	14:53	L	C	14:53	15:11	N	For, G	Interaction with #8, turning over in air, talons clashing
0228-1	BE	Ad	09:45	H	C			N	Flap, S	Came directly over Loomis Hill Rd, heading west, circled up high, lost it in the clouds
0228-2	BE	Juv	12:05	L	C	12:05	12:07	N	Flap, S	Flew up from south along east ridge, about mid-height above pine trees lining the field.
0228-2a	BE	Juv	12:05	H	F			N	Flap, S	Circled up high above houses on Shaver Rd, disappeared east over ridge.
0228-3	BE	Ad	14:05	L	F			N	Flap, S	Flew up from far end southeast ridge.
0228-3b	BE	Ad	14:05	L	C	14:06	14:07	N	flap, S	came low along ridge soaring
0228-3c	BE	Ad	14:05	H	C			N	flap, S	circled up high and went east over ridge
0301-1	BE	Juv	11:00	L	C	11:00	11:03	N	G, Flap, S	Flying together with BE #2
0301-10	BE	Juv	11:36	L	C	11:45	11:52	N	G, S	
0301-10	BE	Juv	14:54	L	C	14:54	14:58	N	G, S	
0301-11	GE	Juv	11:38	L	F			N	G, S	Observer picked this bird up briefly, would later confirm with photos on Page Pond Road. Note from hawkcount.org: While on Page Pond Road, 1st winter GE #11 and Ad. GE #5 clashing talons in the air, before flying off to the E with one another.
0301-12	BE	Juv	15:38	L	C	15:38	15:45	N	Flap, G	
0301-2	BE	Juv	11:00	L	C	11:00	11:03	N	G, Flap, S	Flying together with BE #1
0301-3	BE	Juv	11:02	H	F			N	G, S	
0301-4	BE	Ad	11:13	L	F			N	G, S	
0301-5	GE	Ad	11:18	H	F			N	G, S	Observer believes this to be the same recurring adult GE from 2/9, 2/16 and 2/23, based on distinct plumage and noticeably bright golden head. In sight for 7 minutes.
0301-5	GE	Ad	12:15	L	C	12:15	12:18	N	G, S	Bird returned, achieving lift in the risk area before heading off to the NE once again. In sight for 6 minutes. Note from hawkcount.org: While on Page Pond Road, 1st winter GE #11 and Ad. GE #5 clashing talons in the air, before flying off to the E with one another.

0301-5	GE	Ad	15:14	L	C	15:13	15:15	N	G, Flap	Returned from closest N ridge, perched in the top of a hemlock.
0301-5	GE	Ad	15:15	L	C	15:15	15:35	N	P	Took flight after 20 minutes
0301-5	GE	Ad	15:35	L	C	15:35	15:46	N	Flap, For, G	Took flight and began to get lift of same ridge. Could actively see the bird turning its head in flight, as it foraged. Remained in sight for 15 minutes, 11 minutes before getting above the ridge and heading off to the N.
0301-6	BE	Ad	11:36	L	F			N	G, S	At one point here, 8 BE and 1 GE were seen flying together far to the NE
0301-7	BE	Ad	11:36	L	C	11:45	11:48	N	G, S	
0301-8	BE	Ad	11:36	L	C	11:45	11:48	N	G, S	
0301-9	BE	Juv	11:36	L	C	11:45	11:48	N	G, S	
0304-1	UE	Unk	11:20	L	F			N	P	perched on skyline for >40 minutes. Chased behind trees by large hawk (gos?). Turkeys fled 2 minutes later.
0304-2	BE	Ad	12:31	L	F			N	S, G	
0304-3	GE	Ad	13:25	L	F			N	S, G, For	Extremely light head. So light under cloudy conditions, at first look head-on appeared to be adult BE. Kited 3 times on east ridge: 3 minutes, ~30 seconds, and short instance.
0304-4	BE	Juv	14:13	L	C	14:16	14:17	N	S, G	
0304-5	BE	Juv	15:00	L	F			N	G	Possibly the same bird as 0304-4.
0308-1	BE	Ad	10:45	H	F			N	Fl, Soar	Came up high over west ridge, circled up and slowly moved north, kept circling up high then angled northeast over fields.
0308-2	BE	Juv	11:40	H	F			N	Fl, Soar	Circling high over the northwest fields. Lot of white in shoulders.
0308-3	BE	Ad	12:45	H	F			N	Fl, Soar	3&4 flying together over fields due north
0308-4	BE	Ad	12:45	H	F			N	Fl, Soar	3&4 flying together over fields due north
0308-5	BE	Juv	02:10	H	F			N	Fl, Soar	Probably repeat #2, same area, circled around up high for 15 min
0308-6	BE	Ad	03:15	H	F			N	Fl, Soar	Far south of site, high circling
0309-1	BE	Ad	10:13	L	C	10:13	10:16	N	G, S	
0309-1	BE	Ad	10:16	L	C	10:16	11:54	N	P	Perched in tree near silo (very close) - observer could spot other eagles based on where perched bird was looking
0309-1	BE	Ad	11:54	L	C	11:54	11:59	N	Flap, G, S	Appeared to follow distant eagles after take-off

0309-10	BE	Ad	13:02	H	F			N	G, S	
0309-11	BE	Ad	15:08	H	F			N	G, S	
0309-12	BE	Juv	15:20	H	F			N	G, S	
0309-13	BE	Ad	15:33	L	F			N	G, S	
0309-14	BE	Juv	15:33	L	F			N	G, S	Birds 13 & 14 interacting
0309-2	BE	Juv	11:32	H	F			N	S	
0309-3	BE	Juv	11:51	H	F			N	G, S	
0309-4	BE	Ad	11:53	H	F			N	G, S, Flap	Birds 4 & 5 interacting
0309-5	BE	Ad	11:53	H	F			N	G, S, Flap	Birds 4 & 5 interacting
0309-6	BE	Juv	12:01	L	C	12:01	12:05	N	Flap, G, S	So low overhead, could hear wingbeats
0309-7	BE	Juv	12:16	H	F			N	G, S	
0309-8	BE	Ad	12:31	H	F			N	G, S	
0309-9	BE	Juv	12:46	H	C			N	G, S	
0311-1	PG	UNK	09:41	L	F			Y	F, G	Buzzed raven
0311-10	BE	UNK	11:29	H	F			N	G	
0311-11	BE	AD	13:13	L	F			N	G, S	
0311-12	BE	JUV	13:40	H	F			N	S	
0311-13	GE	AD	15:04	L	F			Y	G, S	
0311-14	GE	AD	15:44	L	F			Y	G, S	
0311-2	BE	JUV	10:57	L	C	10:57	11:00	N	G, S, F	3 aggressive towards 4, actively chasing. Lost sight behind ridge.
0311-3	BE	AD	11:06	L	F			N	F, A, G	3 aggressive towards 4, actively chasing. Lost sight behind ridge.
0311-4	BE	AD	11:06	L	F			N	F, S	
0311-5	BE	AD	11:15	L	F			N	S, G	
0311-6	BE	AD	11:20	L	F			N	F, A	Same as 3 & 4?
0311-7	BE	AD	11:20	L	F			N	F	Same as 3 & 4?
0311-8	BE	AD	11:20	L	F			Y	G, S	

0311-9	BE	AD	11:29	H	F			N	G	
0312-01	GE	Ad	10:36	H	C			Y	F, G	came out of the clouds directly overhead, circled up higher, headed north and disappeared into snow squalls
0312-02	BE	Ad	12:08	H	C			N	F, G	came up along east ridge, went north over fields, turned west, meandered south along west ridge and dipped over trees
0312-03	BE	Ad	12:40	H	C			Y	F, G	came along east ridge with #4, circled up high, headed NE
0312-04	BE	Ad	12:40	H	C			Y	F, G	came along east ridge with #3, circled up high, headed NE
0312-05	BE	Ad	02:51	H	F			N	F, Soar	5&6 interacting high and south of the site
0312-06	BE	Ad	02:51	H	F			N	F, Soar	5&6 interacting high and south of the site
0312-7	GE	Ad	03:30	L	F			Y	F,G	came across gap, up along east ridge moving steadily NE
0312-8	GE	Ad	03:32	L	F			Y	F,G	came along east ridge heading NE
0314-1	BE	Juv	09:35	L	C	09:35	09:38	N	Flap, G	Came from east ridge, along edge of field over trees, circled up over west ridge eventually very high and headed west
0314-2	BE	Ad	11:00	H	F			N	Flap, G	2&3 circling together high over northwest fields
0314-3	BE	Ad	11:00	H	F			N	Flap, G	2&3 circling together high over northwest fields
0314-4	BE	Juv	11:29	L	C	11:29	11:30	N	Flap, G	Came up west ridge low over trees, headed northwest over ridge. Coloring looked like #1
0314-5	BE	Juv	11:40	H	F			N	Flap, G	Likely same 3 as above - all flying over northwest fields for about 15 min.
0314-6	BE	Ad	11:40	H	F			N	Flap, G	Likely same 3 as above - all flying over northwest fields for about 15 min.
0314-7	BE	Ad	11:40	H	F			N	Flap, G	Likely same 3 as above - all flying over northwest fields for about 15 min.
0314-8	BE	Ad	13:50	L	F			N	Flap	Flew up from west ridge, high, dipped low over evergreens below site to south, flying into area probably wetlands. 8 Mallards flew out seconds later.
0317-1	BE	Ad	09:34	L	C	09:34	09:37	Y	Flap, G	
0317-10	BE	Ad	11:40	H	F			Y	Flap, G	
0317-11	GE	Ad	11:41	H	F			N	Flap, G	Actively moving S along ridge, went into dive until out of sight behind E ridge. Very dark bird, appeared to be hunting. In sight 4 min

0317-12	BE	Ad	12:05	L	C	12:05	12:07	N	Flap, G	
0317-13	BE	Ad	15:01	H	F			Y	G, S	
0317-14	BE	Ad	15:09	H	F			Y	G, S	
0317-15	GE	Juv	15:14	L	C	15:14	15:18	N	Flap, For	First identified when the bird dove straight out of the sky onto turkeys - missed the last turkey by only a foot or two as they ran into cover. GE caught lift once again and headed south. Heavily marked, substantial white under wings and in tail. Bleached upper wings
0317-15	GE	Juv	15:40	H	F			N	For	Relocated at 15:40, kiting along the E ridge. Continued to kite along ridge in multiple locations (on map) Took a run at a different prey source NE of the silo. Missed, was harassed by 3 RT before returning to valley. Remained in sight until getting enough lift to continue over E ridge. In sight 30 minutes
0317-16	BE	Ad	16:15	L	C	16:15		N	P	(survey concluded, bird remained perched)
0317-2	BE	Ad	09:48	L	C	09:48	09:50	N	Flap, G	Very low, just above field
0317-3	BE	Ad	10:53	H	C			Y	Flap, G	
0317-4	BE	Juv	10:55	H	C			N	Flap, G	
0317-5	BE	Juv	10:55	H	C			N	Flap, G	
0317-6	BE	Ad	11:02	L	C	11:02	11:06	Y	Flap, G	
0317-7	BE	Ad	11:02	L	C	11:02	11:06	Y	Flap, G	
0317-8	BE	Ad	11:04	L	C	11:04	11:06	Y	Flap, G	
0317-9	BE	Ad	11:27	L	C	11:27	11:29	Y	Flap, G	
0318-1	BE	Ad	09:42	L	F			N	G,S	
0318-10	BE	Ad	10:10	H	F			N	G,S, Flap	Interacting
0318-11	BE	Ad	10:10	H	F			N	G,S, Flap	Interacting
0318-12	BE	Juv	10:14	H	F			Y	G,S	
0318-13	BE	Ad	10:32	L	F			N	P	
0318-14	BE	Ad	10:38	L	C	10:38	10:41	N	Flap, G	Interacting
0318-15	BE	Ad	10:38	L	C	10:38	10:41	N	Flap, G	Interacting
0318-16	BE	Juv	10:40	H	F			Y	S, G	

0318-17	BE	Juv	10:40	H	F			Y	S, G	
0318-18	BE	Ad	10:40	H	F			Y	S, G	
0318-19	BE	Ad	11:38	H	F			Y	G	
0318-2	GE	Ad	09:42	H	F			Y	G,S	All dark, high stream off to N
0318-20	GE	Ad	11:52	H	F			Y	G, S	Ad. bird. Caught lift on E ridge, streamed off N
0318-21	BE	Ad	12:06	L	C	12:06	12:09	N	Flap, G, S	
0318-22	GE	Juv	12:11	H	F			N	G, S	Juv. bird. White in undersides of wings, caught lift beyond E ridge, until too high to see. First picked up in E
0318-23	BE	Ad	12:38	L	C	12:38	12:40	N	G, S	
0318-24	BE	Ad	13:16	H	C			N	G, S	
0318-25	GE	Ad	13:16	H	F			Y	G, S	Adult bird, seen well. Picked up high, streamed off N
0318-26	GE	Ad	13:18	H	C			Y	G, S	Adult bird, seen shortly after GE #25. Behaved similarly, streamed off N
0318-27	BE	Ad	13:51	L	F			N	G, S	
0318-3	BE	Ad	09:46	L	F			N	Flap, G	
0318-4	BE	Ad	09:46	L	F			N	G,S	Interacting
0318-5	BE	Juv	09:48	L	F			N	G,S	Interacting
0318-6	BE	Ad	09:58	H	F			N	G,S	
0318-7	BE	Ad	09:59	H	F			N	G,S	
0318-8	BE	Juv	10:06	H	C			Y	G,S	
0318-9	BE	Juv	10:07	H	C			Y	G,S	
0319-1	GE	Ad	09:27	L	C	09:27	09:29	N	F, G	Flew northwest over site and past west ridge.
0319-10	BE	Ad	14:55	L	F			N	P	tree on top of west ridge above yellow house
0319-11	BE	Ad	14:55	L	F			N	P	in dead tree just below and to the north of #10
0319-11a	BE	Ad	15:30	H	C			N	F	Flew along west ridge, over site high and landed in tree with #10
0319-12	BE	Ad	15:45	L	C	15:45	16:00	N	P	Flew down from perch on west ridge and sat in willow at edge of field. Not sure which - 10 or 11. Flight time <1 minute so not noted.

0319-2	BE	Ad	09:39	L	F			N	P	SE snag
0319-3	PG	Ad	09:59	L	C	09:59	10:00	Y	F	
0319-4	UE	Unk	11:20	H	F			N	F, G	very dark; far south of site and high
0319-5	GE	Ad	12:01	H	C			Y	G	along east ridge
0319-6	BE	Ad	13:10	H	F			N	F, Interacting	far southeast of site, 6&7 interacting
0319-7	BE	Ad	13:10	H	F			N	F, Interacting	far southeast of site, 6&7 interacting
0319-8	BE	Ad	14:01	H	C			N	F, G	came over site, high, circled up over northwest fields
0319-9	PG	Ad	14:15	L	C			Y	F, G	dove at RT along the east ridge
0320-1	BE	Ad	09:45	L	C	09:47	09:48	Y	S, G	
0320-2	BE	Ad	10:28	H	F			Y	S, G	
0320-3	BE	Ad	12:37	L	C	12:37	12:40	N	G, F	Circled in a small area, repeatedly flapping and gliding to maintain a steady altitude. We to ground at 12:40 behind willows, out of sight. A driver stopped 1 h 20 m later to say it was still on the ground in that area.
0320-4	GE	Ad	13:25	L	F			N	G, S, For	Kited in 3 places, max for ~1 minutes. In sight 5 minutes. Flew due S into a steady S wind. Dark head for golden.
0320-5	BE	Juv	13:40	L	F			N	G, S	In and out of trees, circling low. Seen doing the same several times in the same location.
0320-6	BE	Ad	14:13	L	F			N	G, S	Going south.
0320-7	BE	Ad	14:13	H	F			N	S	
0320-8	BE	Juv	14:15	L	F			N	S	With #6
0320-9	GE	Ad	15:14	L	C	15:15	15:16	Y	F, G	Powered flight in part. Flapping and gliding about 2/3 the way up the ridge.